

SEAC4RS Transit Flight Report

2013-08-08 DFRC → EFD

Takeoff: 1638 UT, landing: 2346 UT, duration: 7.1 hours

Pilot: Dean Neeley

Summary:

The basic objective of this flight – to transit the aircraft to Ellington Airfield – was achieved. Along the way, in situ measurements of tracers were made to investigate the upper troposphere/lower stratosphere chemical structure of the North American Monsoon (NAM), and remote-sensing measurements of a Saharan dust layer over Texas and the Gulf were obtained (see flight path below). The flight was delayed by about 38 minutes because of a false hydrazine alert at DAOF had delayed access to the aircraft. The initial part of the flight north of Palmdale provided measurements outside the NAM anticyclone, and the transect across the country into Texas provided information about the tracer gradients across the edge of the anticyclone. Several vertical profiles were executed down to 45 kft, with at least one profile extending down to 41 kft (see curtain plot below), which provided measurements well into the upper troposphere over Texas. A flight leg coordinated with the DC-8 was flown just off the Gulf coast and provided remote-sensing measurements of the dust in the boundary layer for comparison with DC-8 in situ and remote-sensing measurements.

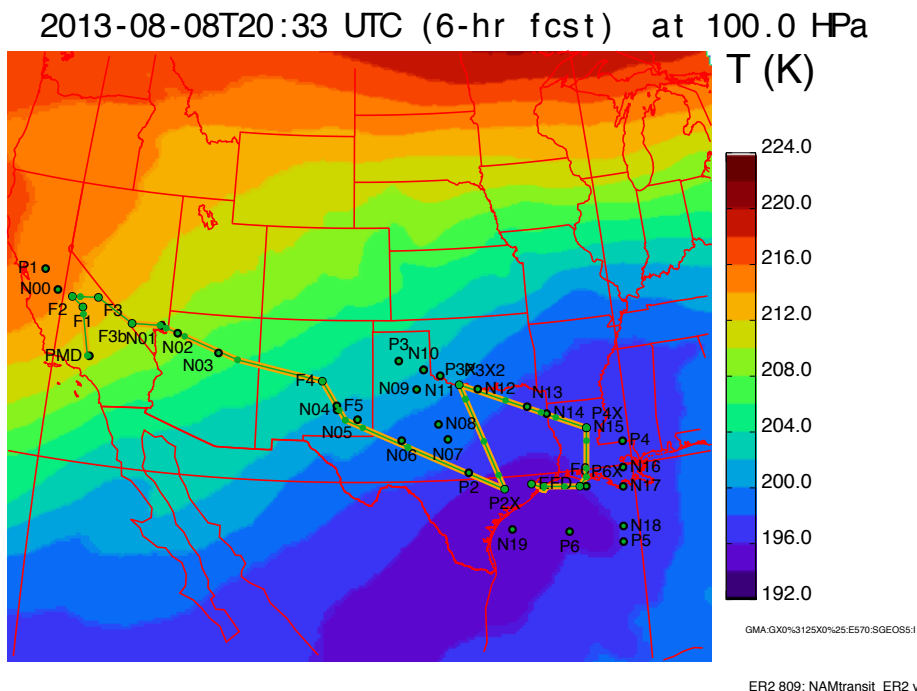


Figure 1. Flight path overlaid on 100 hPa temperature.

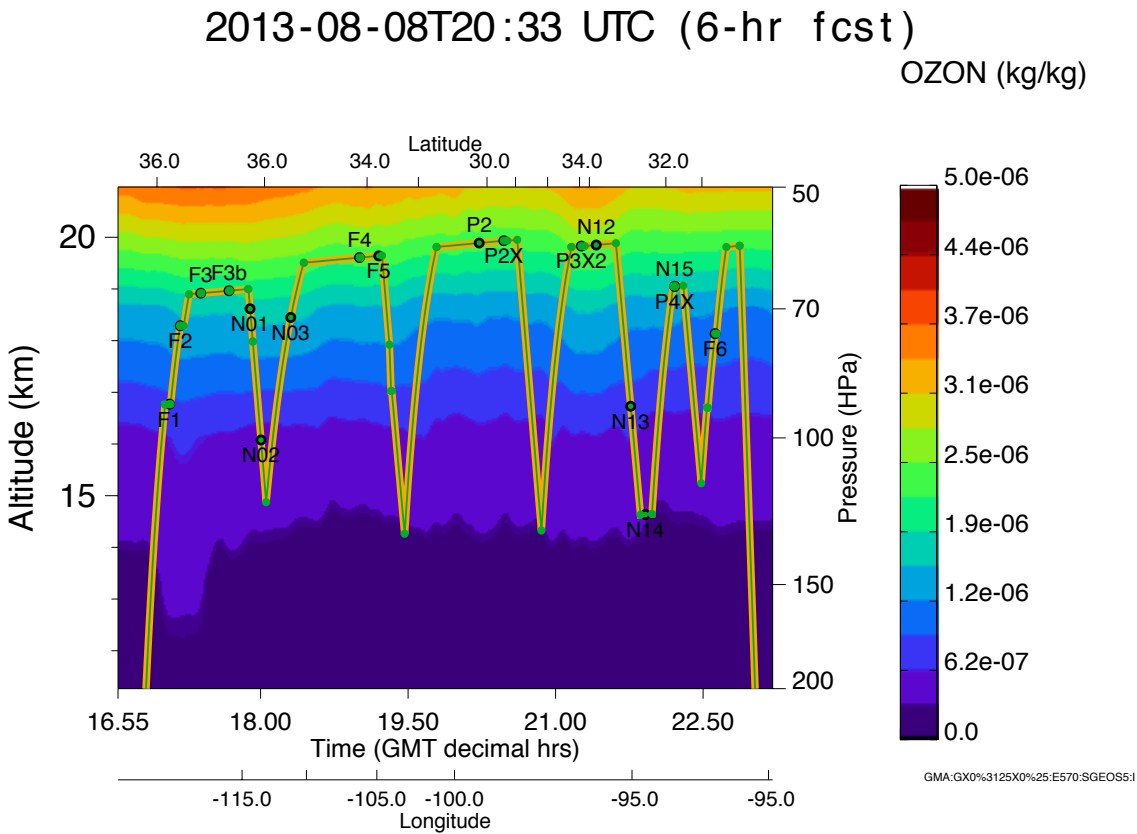


Figure 2. ER-2 altitude versus time overlaid on GMS ozone concentration.

The preliminary, real-time water vapor data (from the Harvard instrument) indicated a layer of enhanced water vapor well above the tropopause over Texas. Relative humidity (based on preliminary JLH water and MMS temperature) and CO from HUPCRS (shown below) indicate recent convective injection up to near the high tropopause (see Figure below). Ice crystals were detected by FCDP in the supersaturated layer.

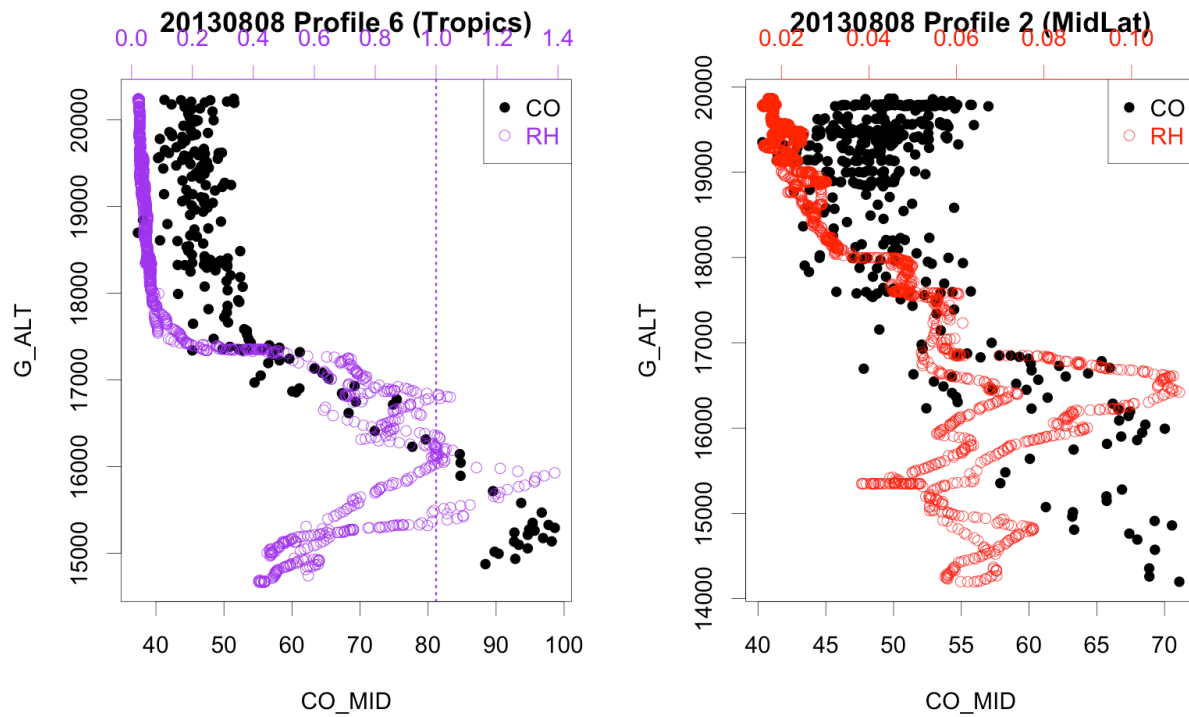


Figure 3. Profiles of CO (from HUPCRS) and ice saturation ratio (RH, from JLH and MMS) versus altitude from two different ER-2 profiles. Layers of enhanced relative humidity and CO near the tropopause (around 16 km) are apparent. (Preliminary data courtesy Steve Wofsy, Bob Herman, and Paul Bui.)

Instruments generally performed well. The RSP switch was inadvertently turned off, which may have cold-soaked the instrument, and so RSP did not collect data. Fortunately, purge system did not freeze in flight and provided purge throughout the mission even though it was unheated and so RSP was undamaged. eMAS did not collect data because of an earlier power supply failure. Harvard TDL water vapor system had some issues with instrument accuracy that are under investigation.